

CLAIMS

1. A titanium alloy member characterized in that:

it comprises 40% by weight or more titanium (Ti), a IVa group element and/or a Va group element other than the titanium, wherein a summed amount including the IVa group element and/or the Va group element as well as the titanium is 90% by weight or more;

it comprises grains which are a body-centered tetragonal crystal or a body-centered cubic crystal in which a ratio (c/a) of a distance between atoms on the c-axis with respect to a distance between atoms on the a-axis falls in a range of from 0.9 to 1.1; and

it has a texture, when a polar figure of the (110) or (101) crystal plane of the grains is measured parallelly to a plane, which involves a working direction, in ranges of $20^\circ < \alpha' < 90^\circ$ and $0^\circ < \beta < 360^\circ$ by the Schlotz's reflection method, and when the respective measurement values (X), which distribute equally on the polar figure, are processed statistically, texture in which a value ($\sqrt{2}/X_m^2$), which is obtained by dividing a secondary moment ($\sqrt{2}$) around a mean value (X_m), being defined by the following equation, with a square of the mean value (X_m^2), is 0.3 or more, a value ($\sqrt{3}/X_m^3$), which is obtained by dividing a tertiary moment ($\sqrt{3}$) around the mean value (X_m), being defined by the following equation, with a cube of the mean value (X_m^3), is 0.3 or more, and values ($1.6X_m$), which are 1.6 times or more of the mean value, are further involved in measurement values, which are measured in a range of $55^\circ < \alpha' < 65^\circ$ and in the range of β along the working direction;

Secondary Moment: $\sqrt{2} = \{ \sum (X - X_m)^2 \} / N$

Tertiary Moment: $\nu_3 = \{ \sum (X - X_m)^3 \} / N$
(Note that N is a number of samplings.).

2. The titanium alloy member set forth in claim 1, including one or more elements of an interstitial element group, consisting of oxygen (O), nitrogen (N) and carbon (C), in a summed amount of from 0.25 to 2.0% by weight.

3. The titanium alloy member set forth in claim 2, including one or more elements of said interstitial element group in a summed amount of from 0.6 to 1.5% by weight.

4. A process for producing a titanium alloy member characterized in that it comprises:

preparing step of preparing a raw material, the raw material comprising titanium and an alloying element, and having a specific composition in which a compositional mean value of substitutional elements is $2.43 < Md < 2.49$ with regard to the energy level "Md" of the d-electron orbit and a compositional mean value of the substitutional elements is $2.86 < Bo < 2.90$ with regard to the bond order "Bo", the "Md" and the "Bo" each being a parameter obtained by the "DV-X α " cluster method; and

member forming step of forming a titanium alloy member comprising the raw material after the preparing step.

5. The process for producing a titanium alloy member set forth in claim 4, wherein said preparing step is a powder preparing step in which a raw material powder for making the specific composition

is prepared; and

said member forming step is a sintering step in which a sintered member is manufactured from the raw material powder after the powder preparing step.

6. The process for producing a titanium alloy member set forth in claim 4, wherein said member forming step is an ingot manufacturing step in which an ingot member is manufactured from said raw material after said preparing step.

7. The process for producing a titanium alloy member set forth in claim 5 or 6, further comprising a cold-working step in which said sintered member or ingot member is cold-worked.

8. The process for producing a titanium alloy member set forth in claim 7, wherein said cold-working step is a step in which a cold-working ratio is 10% or more; and

the process further comprises an age-treatment step, in which age-treatment is carried out so that the Larson-Miller parameter "P" (hereinafter simply referred to as the parameter "P") falls in a range of from 8.0 to 18.5 at a treatment temperature falling in a range of from 150 °C to 600 °C, after said cold-working step.

9. The process for producing a titanium alloy member set forth in claim 8, wherein said age-treatment step is a step in which said parameter "P" falls in a range of from 8.0 to 12.0 at said treatment temperature falling in a range of from 150 °C to 300 °C; and

the titanium alloy member obtained after the age-treatment

step has a tensile elastic strength of 1,000 MPa or more, an elastic deformation capability of 2.0% or more and a mean Young's modulus of 75 GPa or less.

10. The process for producing a titanium alloy member set forth in claim 8, wherein said age-treatment step is a step in which said parameter "P" falls in a range of from 12.0 to 14.5 at said treatment temperature falling in a range of from 300 °C to 600 °C; and

the titanium alloy member obtained after the age-treatment step has a tensile elastic strength of 1,400 MPa or more, an elastic deformation capability of 1.6% or more and a mean Young's modulus of 95 GPa or less.

11. A titanium alloy member exhibiting a dislocation density of $10^{11}/\text{cm}^2$ or less when cold working is carried out by 50% or more.

12. The titanium alloy member set forth in claim 11, comprising:
40% by weight or more titanium;

a IVa group element and/or a Va group element other than the titanium, wherein a summed amount including the IVa group element and/or the Va group element as well as the titanium is 90% by weight or more; and

one or more elements of an interstitial element group comprising oxygen, nitrogen and carbon in a summed amount of from 0.25 to 2.0% by weight.

13. A titanium alloy member characterized in that:
it comprises titanium and an alloying element; and

it has a specific composition in which a compositional mean value of substitutional elements is $2.43 < Md < 2.49$ with regard to the energy level "Md" of the d-electron orbit and a compositional mean value of the substitutional elements is $2.86 < Bo < 2.90$ with regard to the bond order "Bo", the "Md" and the "Bo" each being a parameter obtained by the "DV-X α " cluster method.

14. The titanium alloy member set forth in claim 13, exhibiting a dislocation density of $10^{11}/\text{cm}^2$ or less when cold working is carried out by 50% or more.